

ENCLOSURE 4

APP-GW-GLY-056  
NRC Observations Roadmap for WCAP-17938 & Related Documentation  
Revision 0

(Non-Proprietary)

**NRC Observations Roadmap for WCAP-17938 & Related Documentation - Table**

No.	Observation	Date Received	Communication	Resolution or Resolution Location
1	Potential loss of the [ ] <sup>a,c</sup> required for protection against jet impingement.	3/28/2014	NMI Audit Summary	<p>This observation is addressed by the results of testing. JIT included cases where the outer box was not damaged.</p> <p>See Neutron Shielding Block Jet Impingement and Submergence Testing Summary Sections in WCAP-17938 (Sections 3.4.4 and 3.5.2 respectively).</p>
2	Aging effects	3/28/2014	NMI Audit Summary	See Aging Effects Section in WCAP-17938 (Section 5.1.2)
3	Design basis for GSI-191 and long-term cooling. (Integration of GSI & LTC design basis)	3/28/2014	NMI Audit Summary	<p>The various concerns raised in this comments are addressed in the following sections of WCAP-17938:</p> <ul style="list-style-type: none"> <li>• Break Selection is addressed in the Debris Generation Break Size Section (4.1)</li> <li>• Jet Pressure Calculations and Bounding Test Configuration are both addressed in the Comparison of PWROG Facility Data with AP1000 Facility Data Section (3.3)</li> <li>• Analysis of Chemical Effects is addressed in the AP1000 GSI-191 Chemistry Effects Evaluation calculation note</li> </ul>

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4	Repeatability and uncertainty	3/28/2014	NMI Audit Summary	Repeatability and Uncertainty of the testing is discussed in Comparison of PWROG Facility Data with AP1000 Facility Data Section (3.3) of WCAP-17938.
5	Requirements for the new materials (Ventilation flow rates)	3/28/2014	NMI Audit Summary	This observation is considered to be outside the scope of this WCAP.
6	Potential impact on other parameters important to safety (Introduction of [ ] <sup>a,c</sup> and effect on other safety analysis)	3/28/2014	NMI Audit Summary	This question is directed to other safety analyses, not GSI-191, and therefore is not covered in the WCAP. However note that chemical effects are reviewed in the AP1000 GSI-191 Chemistry Effects Evaluation calculation note. [ ] <sup>a,c</sup> would only be produced from exposed surfaces, and the [ ] <sup>a,c</sup> is not exposed. The amount of aluminum from the blocks is very small relative to the allowable limit.
7	Test acceptance criteria.	3/28/2014	NMI Audit Summary	See WCAP-17938 Sections on Test Acceptance Criteria (3.4.3.2, 3.4.4.1, 3.5.2.1)
8	Calculation of test pressure	3/28/2014	NMI Audit Summary	See WCAP-17938 Sections on Comparison to PWROG (3.3) and Alternate Break Size (4.1).
9	Shield block manufacturing tolerances	3/28/2014	NMI Audit Summary	The shielding blocks have a [ ] <sup>a,c</sup> construction. The [ ] <sup>a,c</sup> procedures and qualifications shall comply with standard industry [ ] <sup>a,c</sup> codes. The [ ] <sup>a,c</sup> procedures will be submitted by the fabricator to Westinghouse for review and approval prior to fabrication.

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10	Test acceptance criteria.	3/28/2014	NMI Audit Summary	See previous response to acceptance criteria comment (item #7).
11	Integration with the design basis for chemical effects	3/28/2014	NMI Audit Summary	Integration of chemical effects is detailed in the AP1000 GSI-191 Chemistry Effects Evaluation calculation note. Submergence test results are presented in WCAP-17938 Subsection 3.5.2.4.
12	Procedural details	3/28/2014	NMI Audit Summary	Autoclave cleaning is described in Submergence Testing Report (TR-CCOE-14-02) and generally discussed in WCAP-17938 subsection 3.5.2.
13	EQ Standard for Cable Aging	5/22/2014	Verbal (@ Presubmittal)	Cable EQ requirements were used in the cable aging specification with the exclusion of post-accident conditions since the LOCA is the initiating event and the potential means of cable debris generation. The post-accident radiation and temperature transients were not included in the aging specification. The AP1000 Cable Aging for Jet Impingement Testing document contains the complete aging specification.
14	Maintaining Cable Requirements After Plant Operation	5/22/2014	Verbal (@ Presubmittal)	The Utilities will institute a Design Change Program, which will review changes against the Licensing Basis and Design Basis (including Criteria documents).
15	Justification for Cable Spacing in Test	5/22/2014	Verbal (@ Presubmittal)	See upcoming response to Cable Spacing observation (item #25).

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16	Screen Efficiency vs. Loading	5/22/2014	Verbal (@ Presubmittal)	The conclusion of AP1000 Non-Coatings Debris Contributions Toward GSI-191 Debris Limits Calculation is that no additional debris is produced - see Results section.
17	Request access to jet impingement test matrix, plans, and procedures at Twinbrook	6/3/2014	Email Attachment - 6/3	This occurred during December 1st/2nd 2014 Audit.
18	Walkthrough 3D model of AP1000 design (inside containment)	6/3/2014	Email Attachment - 6/3	This occurred during December 1st/2nd 2014 Audit.
19	Modification to Acceptance Criteria Comment	6/13/2014	Verbal (@ Audit)	See previous response on Acceptance Criteria (item #7).
20	Investigation of Unusual Results ([ ] <sup>a,b,c</sup> )	6/13/2014	Verbal (@ Audit)	Submergence Test Results for the [ ] <sup>a,c</sup> NS blocks are described in Section 3.5.2.4 of WCAP-17938. The presence of silica resulted in a change to a [ ] <sup>a,c</sup> NS block design.
21	Justification that the NTS test facility produces representative (or bounding) high energy line break conditions	6/17/2014	Public & Closed Meeting Summary	See section in WCAP-17938 that details Comparison of AP1000 Facility to PWROG (3.3) and comparison of AP1000 Facility to AP1000 Licensing Basis (3.4).
22	Selection of break dimensions, distances and use of ANSI 58.2	6/17/2014	Public & Closed Meeting Summary	ANS 58.2 is no longer being used for selecting break distances.
23	Effects of cavity annulus on free expansion jet model	6/17/2014	Public & Closed Meeting Summary	This has been addressed in the Considerations Resulting from Confined Jet Behavior Section (3.4.4.4) of WCAP-17938.
24	Cable Characterization	6/17/2014	Public & Closed Meeting Summary	Per the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note, no debris from cables is expected.

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25	Cable Specimen Arrangement (arrangement orientation, spacing, number and type for testing bounds design)	6/17/2014	Public & Closed Meeting Summary	Comparison of cable testing arrangement to the plant arrangement, see section 5.3 of WCAP-17617 Volume 1.
26	Counter Flow Limitation Assumptions	6/17/2014	Public & Closed Meeting Summary	Since no additional debris generation is expected, the countercurrent flow calculation is no longer needed to support WCAP-17938.
27	Core Debris Time Limit (24 hours)	6/17/2014	Public & Closed Meeting Summary	Since no additional debris generation is expected, the countercurrent flow calculation is no longer needed to support WCAP-17938.
28	Strainer Bypass Fraction Variability	6/17/2014	Public & Closed Meeting Summary	Since no fiber is generated, this is no longer a concern – see conclusions of the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note.
29	Characterize What [ ] <sup>a,b,c</sup> Is	8/26/2014	Evaluation (Feb-July 2014)	See previous response (item 20) on [ ] <sup>a,b,c</sup> in submergence samples.
30	Temperature Differences between Filtration and Chemical Effects WCAP	8/26/2014	Evaluation (Feb-July 2014)	Justification for the temperature selected is discussed in the Sampling Procedure Section (3.5.2.3) of WCAP-17938.
31	Correction of Fixture Effects	8/26/2014	Evaluation (Feb-July 2014)	WCAP-17617-P Volume 1, section 5.2, contains a section discussing the fixture modifications that were made to ensure that the cables were tested and not the fixture.
32	Conservatism of Cable Fixture to Actual Plant Configuration	8/26/2014	Evaluation (Feb-July 2014)	This is discussed in Section 5.2 of WCAP-17617 and Section 3.4.2.1 of WCAP-17938.
33	Plant vs Test Conditions for Cables (Temperature of Cables, etc.)	8/26/2014	Evaluation (Feb-July 2014)	This comment is addressed in the Cable Specimens Section (3.4.2.1) of WCAP-17938.

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34	Justify Pressure at Target (calibration)	8/26/2014	Evaluation (Feb-July 2014)	See previous response to comment (item #4).
35	Effects of aging on NMI	8/26/2014	Evaluation (Feb-July 2014)	See previous response to comment (item #2).
36	Characterization of Damage on Cables	8/26/2014	Evaluation (Feb-July 2014)	See previous response to comment (item #24).
37	How does damage on NMI factor into Suitable Equivalency	8/26/2014	Evaluation (Feb-July 2014)	The Neutron Shield Block Jet Impingement Section (3.4.4.2) of WCAP-17938 details that no damage was experienced for the [ ] <sup>a,c</sup> design.
38	Unexpected Flow Decrease in Jet	8/26/2014	Evaluation (Feb-July 2014)	Figure 4-15 of WCAP-17616 Volume 1 shows a compilation of the exit flows from the NMI test program. In this figure there are no unexpected decreases in the jet flow.
39	Inclusion of Fiber Assessment in Submergence Testing Evaluation	8/26/2014	Evaluation (Feb-July 2014)	The Fibers Section (4.8) of TR-CCOE-14-02 reviews the process for examining specimens for fibers.
40	Observation about [ ] <sup>a,b,c</sup> failures	10/6/2014	Interim Audit Summary	No response needed.
41	Debris Characterization and Effect on Fleet Wide GSI-191 Program	10/6/2014	Interim Audit Summary	Not mandatory to address Fleet effects in AP1000 specific WCAP and documentation.
42	Justification that Test Conditions are Conservative to Postulated AP1000 LOCA	10/6/2014	Interim Audit Summary	See previous response to comment (item #21).
43	Demonstration that Calculated Jet Pressure was Achieved During Test	10/6/2014	Interim Audit Summary	See previous response to comment (item #4).
44	Conservatism of NMI Fixture to Actual Plant Configuration	10/6/2014	Interim Audit Summary	Section 5.1.3 of WCAP-17938 discusses conservatism of NMI jet impingement testing.

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45	Disposition [ ] <sup>a,c</sup> release from Test	10/6/2014	Interim Audit Summary	Submergence Test Results for the [ ] <sup>a,c</sup> NS blocks are described in Section 3.5.2.4 of WCAP-17938 and Section 4.6 and 5.3 of TR-CCOE-14-02. The presence of silica resulted in a change to a [ ] <sup>a,c</sup> NS block design.
46	Address Variability in Tests Using Specific Test Data	10/10/2014	September 16th Meeting Summary	See section in WCAP-17938 that details Comparison of AP1000 Facility to PWROG (3.3).
47	Justify No Fines or Small Particulates in Cable Debris	10/10/2014	September 16th Meeting Summary	The conclusion of the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note is that no additional debris is produced - see Results section.
48	Demonstrate Debris Technical Basis is Defensible Relative to Previously Approved Debris Evaluations	10/10/2014	September 16th Meeting Summary	The conclusion of the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note is that no additional debris is produced - see Results section.
49	Description of Cable Protection Schemes	10/10/2014	September 16th Meeting Summary	The Cable protection schemes are detailed in the Appendix A of the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note.
50	Justify that Fibers can be Detected Using Filtration rather than Visual Inspection	10/10/2014	September 16th Meeting Summary	The Fibers Section (4.8) of TR-CCOE-14-02 reviews the process for examining specimens for fibers.
51	Reconcile Gamma Exposure Between Test Data and Calculated	10/10/2014	September 16th Meeting Summary	This is addressed in the chemical effects calculation note, in the NMI Appendix (A.3)



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52	Consider Potential Plugging in Neutron Shield [ ] <sup>a,c</sup>	10/10/2014	September 16th Meeting Summary	Any material plugging [ ] <sup>a,c</sup> will fail (relieving the internal pressure) before failure of the stainless steel [ ] <sup>a,c</sup> encapsulation occurs.
53	Reiteration of Confined Jet Behavior Concern Not Being Adequately Addressed.	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	See previous response to comment (item #23).
54	Consider Whether Region I and II Are Both Needed Under Alternate Evaluation Method	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	Both Region I and II have been considered - see Section 4 of WCAP-17938.
55	Determine if Containment Sump Performance and Safety Analysis Require Demonstration Per Region I and II	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	Because there are no additional debris loads, the previous containment sump performance is deemed acceptable.
56	[ ] <sup>a,c</sup> Blockage	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	See previous response to comment (item #52).

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57	Design Basis for Pressurizer Cable Protection Barriers	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	Information on the design information for the Pressurizer Cable barriers is included in Appendices of the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note.
58	Configuration Control for Pressurizer Cable Barriers	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	The details of these barriers are included in the AP1000 design basis. Any changes must be evaluated through the AP1000 Design Change Process.
59	Acknowledgement of Previous Observations being Addressed	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	No response needed.
60	Aging Effects in Chemical Analysis of NMI	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	Aging effects of NMI are addressed in subsection 5.1.2 of WCAP-17938.
61	Chemical Effects of [ ] <sup>a,c</sup>	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	Chemical Evaluation of [ ] <sup>a,c</sup> has been added in a revised version of the AP1000 GSI-191 Chemistry Effects Evaluation.

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62	Chemical Effects of [ ] <sup>a,c</sup>	2/12/2015	Audit Summary AP1000 Equivalent Insulation Topical Report, Jet Impingement Testing, Submergence Testing, Design Changes	[ ] <sup>a,c</sup> , is addressed in Appendix G of the AP1000 Non-Coating Debris Contributions Towards GSI-191 Debris Limits calculation note.